STEREO Product Assurance

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Quality Assurance Requirements and Documentation

Performance Assurance Implementation Plan (PAIP)

SEREO-IMPACT-PAIP_C.doc Version F – 2002 – October 15

Impact Instruments	Status of PAIP
SWEA	Approved
STE	Approved
MAG	Approved
BOOM	Approved
IDPU	Approved
SEPT	Approved
HET	Approved
LET	Approved
SIT	Approved
SEP Central	Approved

Responsibilities of Performance Assurance

- Procurement and Subcontractor Controls
- Receiving Inspection
- Clean Room Controls
- Manufacturing and ESD Controls
- Calibration Controls
- Personnel Training and Certification to NASA Standards

Manufacturing, Assembly, and Quality Control of Electronic System will be in compliance to the following NASA technical standards:

- **NASA-STD-8739.1** Workmanship Standards for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies
- **NASA-STD-8739.2** Workmanship Standard for Surface Mount Technology
- **NASA-STD-8739.3** Soldered Electrical Connections
- **NASA-STD-8739.4** Crimping, Interconnecting Cables, Harness, and Wiring
- **NASA-STD-8739.7** Electrostatic Discharge Control

- In-process Inspection and Test Monitoring During Manufacturing
- Integration and Testing Readiness Review / Test Witness
- Verification and Environmental Test Review
- Final Acceptance Data Package
- Problem Failure Reporting and Review
- Configuration Management and Data Control
- Internal and External Auditing
- Support Test Readiness Reviews and Pres-Ship Reviews

STEREO IMPACT Supplier Audit Status

• JPL / GSFC	• Approved
• UCB / SSL	• In Process
• CORWIL assembly house	• In Process
• WYLE Labs	• Approved
• GTL	• Approved
• Caltech	• Approved

Problem/Failure Reporting

- **Problem/failure reporting may be informal up to the time of integration with flight hardware**

- **After flight software/hardware integration, problem/failure reporting will be in accordance with the standard Failure Reporting, Failure Analysis, and Corrective Action process**

HESSI

HIGH ENERGY SOLAR SPECTROSCOPIC IMAGER

PROBLEM REPORT
PR-040
SAS ACS Data Incorrect
ADP
02-10-00

PR-040 ADP SAS ACS Data Incorrect

Assembly : IDPU	**SubAssembly :** ADP
Component : FSW	
Originator: D. Curtis	**Organization:** UCB
Phone : 510-642-5998	**Email :** dwc@ssl.berkeley.edu

Problem Occurred During (Check all that apply √)

Functional test	Qualification test	√ S/C Integration	Launch operations

Environment when problem occurred:

√ Ambient	Post Vibration	Shock	Acoustic
Vacuum	Thermal-Vacuum	EMI/EMC	

Problem Description

During testing of the ADP on the spacecraft, the SAS simulators were connected and operated to determine the ACS backup data sent from the IDPU to the spacecraft SEM. We expected to see a four second series of calculations, but saw a fixed pattern that repeated each .25 seconds.

Analyses Performed to Determine Cause

Removed the SAS Simulators and found that the programming PROM and Actels were not compatible. The units were, in fact, generating a pattern as described by the SAS ACS data.

Corrective Action/ Resolution

Load new version of ADP software 2-17-00. Verified correct SAS ACS data during IDPU level testing.

Distribution: Ron Jackson, Peter Harvey, David Curtis, Aliko

Waivers and Deviations

- Waivers and deviations at the system level (spacecraft and instrument at UCB)
  - UCB has authority to approve waivers and deviations as long as it does not affect the level 1 science requirements
  - NASA HQ must approve waives and deviations if level 1 science requirements are affected
- Waivers and Deviations at lower levels
  - For nonconforming deliverable assemblies, components and subsystems that are submitted to UCB for delivery, a waiver is submitted to UCB for review and approval
  - Waivers are documented and submitted to the UCB Project Manager and the UCB Product Assurance Representative for review and approval
  - Waivers provide sufficient information to allow determination of acceptability by UCB, to include a complete description of the reason for the request and the technical justification for acceptance
  - All approved waivers for a deliverable item are included in the Acceptance Data Package for that item
- Currently, there are no waivers requiring NASA HQ approval.

PROCESS FOR TRACKING OPEN WORK ON DELIVERED ITEMS

- **Open work on delivered items is documented in the same manner as a discrepancy**
  - **During the pre-delivery review by the supplier, the QA representative notes that some items have not been completed and initiates a Problem Report**
  - **The disposition on the document may indicate that the remaining work must be completed at the next assembly level (following delivery to the customer)**

Status of Material and Processes Program

- **STEREO / IMPACT and its subcontractors / collaborators will implement a materials and processes program as per PAIP, which includes maintaining an as-designed and as-built list for Inorganics and Metallics, Polymerics, Lubricants, and Processes.**

- **As a minimum, materials planned to be used will conform to 1.0% Total Mass Loss (TML) and 0.1% Vacuum Condensed Material (VCM) per NASA Specification and STEREO / IMPACT Contamination Control Plan.**

- **Approved material and process lists presented to GSFC for review and approval.**

- **No outstanding issues.**

Status of System Safety Program

- Comply with EWR 127-1, Eastern and Western Range Safety Requirements
- Comply with GSFC code 460 safety plan
- Establish and support spacecraft System Safety Program Plan
- Perform Preliminary Hazard Analysis (PHA)
- Maintain Hazard Control verification Log
- Develop Safety Noncompliance Reports as required

STEREO PARTS REQUIREMENTS

STEREO Parts Requirements

- **311- INST-001, Grade 2**
  - **Parts in compliance with 311-INST-001, Grade 2 requirements and Standard Parts.**
  - **Use PPL 21 preferred parts, design permitting.**

- **PIND, per Mil-STD-750 and Mil-STD-883, required for cavity devices.**
  - **Impose on manufacture, if possible.**
  - **When needed, have DESC approved test facility perform testing.**

- **CSI and/or DPA for complex or known problem devices.**

STEREO Parts Requirements (continued)

- Non-standard EEE parts will require at a minimum: PEM
  - DPA, Preconditioning, HAST, CSAM
- Radiation Testing
  - Total Ionizing Dose Requirement 8 Krads (si)
    - Review existing test data from GSFC, JPL & Manufacturer
    - Review NASA “where used” historical data
      - Parts o.k. to use if data and/or orbit requirements equals or exceeds STEREO
    - When needed, will perform Cobalt 60 TID testing
  - Single Event Effects: use existing data or historical use similarity
    - Whenever possible, designers will use latchup immune devices
    - Exceptions are handled on case by case basis with STEREO Project Office
    - Proton Single Event done by GSFC
      - AD7664AST
      - UT9Q512

STEREO EEE Parts List

- **UCB QA will maintain EEE Parts Identification List (PIL)**

- **PIL will contain**
  - **Manufacturer's generic part number**
  - **Military part number or SCD number**
  - **Manufacturer(s)**
  - **Where used (unique assembly) / Quantity used**
  - **Quantity ordered**
  - **Lot/Date Code**
  - **Radiation status (TID / SEL)**
  - **Project Approval Status**
  - **Alert status**
  - **Comments**

STEREO EEE Parts List (continued)

- **Parts will be procured to an approved Parts List**
  - **Schedule permitting, will do STEREO common buy.**
  - **Procurement of devices will be based upon design Engineers Confidence-of-use factor of 70%.**
    - **Unique, high dollar items will be at 90% - 100% Confidence Level**
  - **Minimum Attrition / Spares factor of 20% - 30% will be applied to flight procurement quantities. Standard devices will have higher spares' factor.**
  - **Schedule and Cost permitting, Engineering test units will use flight qualified part. Especially where minimum buy quantities are imposed.**

- **ETU and Flight units**
  - **Procurements will run concurrently**

- **Flowdown PAIP requirements on subcontractors.**

STEREO EEE Parts List (continued)
Parts Control Board (PCB)

- **PCB members: STEREO QA, Parts Engineer (GSFC), design Engineer and STEREO – Berkeley Project Manger, or representative.**

- **PCB shall review EEE part for:**
  - **Testing, Screening and Qualification requirements**
  - **Alerts**
  - **Review non-standard parts requirements**

- **PCB will disposition EEE parts failures and nonconformance issues.**

- **UCB QA will coordinate PCB parts issues with GSFC Flight Assurance Manager, or his representative.**

GIDEP Alert Review

- **Microcircuits**
  - **32 ea. Checked ok**
- **Semiconductor Devices**
  - **17 ea. Checked ok**
  - **1 ea. Checked bad**
- **Resistors/Capacitors**
  - **31 ea. Checked ok**
- **Connectors**
  - **29 ea. Checked ok**
- **Wire/Harness**
  - **11 ea. Checked ok**
- **Misc. Materials**
  - **6 ea. Checked ok**
- **Mechanical Parts**
  - **0 ea. Checked**

s of 08/11/02

ote: GSFC GIDEP system down

EEE Parts with Issues

Part Type	Instrument	Problem	Corrective Action
AD7664AST	STE/SWEA Preamp and Interface	Radiation Latchup	Proton Single Event performed by GSFC or Redesign boards LTC1604
UT9Q512	STE/SWEA Preamp & Interface, DCB	Radiation Latchup, Unknown Proton SEU	GSFC Perform tests
ADP3300ART-S	SEPT Electronics	Long lead item requiring screening	Arrange for screening
MAX892LEUA	SEPT Electronics	Long lead item requiring screening	Arrange for screening
MOX Resistors	SIT HVPS	Long lead item requiring screening	Arrange for screening
MX16-JFET	STE/SWEA Preamp and interface	Long lead item requiring screening	Arrange for screening
3OLTQ100SCS	IDPU LVPS, SEP LVPS, SWEA + BIAS LVPS, & Plastic LVPS	Delivery Issue	Upscreen 50 commercial devices concurrent with 30 piece order.